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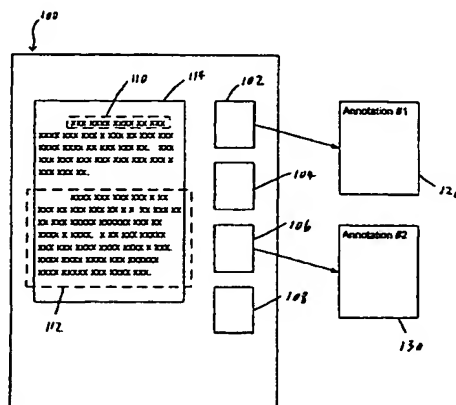
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(54) Title: METHOD FOR DEDUCING LEVEL OF INTEREST IN INFORMATION STRUCTURES VIA ANNOTATIONS



(57) Abstract: A method for deducing user interest in, and the valuation of, specific pieces of information presented to a user within an information structure. Such information structures include, for example, websites and webpages. The textual and graphical objects on a webpage are associated with an area for adding annotations that pertain to the objects. The user selects, or highlights, certain objects and enters annotations in the appropriate area. Thereafter, a level of interest (or valuation) of an object, a set of objects, or an information structure can be deduced from the annotations. This level of interest can be used to develop a model of a particular user or group of users. A pattern of progression through a set of information can also be developed. The model or pattern can be used to direct subsequent presentation of information to the user. The relative valuation of the information might be used to direct further development (or editing) of the content of a website. The annotations can also be searched and used to present hierarchical layouts of information according to such search criteria.

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Method for Deducing Level of Interest in Information Structures via Annotations

Field of the Invention

This invention relates to the display of graphical and textual objects on a webpage, and more specifically to a method for adding annotations to such objects. The annotations can be used to indicate the level of interest in certain webpages. The relative interest can be used, among other things, to develop a prediction pattern through linked and/or related webpages for similar users.

Background of the Invention

A computer network is a geographically distributed collection of interconnected communication links for transporting data between nodes, such as computers. By definition, a network is a group of computers and associated devices that are connected by communications facilities or links. The Internet originated as a collection of linked, or networked, computers, which could transfer information across the network via any configurable pathway between the machines. In the event that one machine was rendered inoperable, an alternative pathway could be used to eventually transfer the information from a source to its ultimate destination. The Department of Defense fostered the development of various protocols (e.g. IP, TCP) which utilized this redundant structure to exchange information between machines. Most notably, in last 8-10 years there has been an exponential growth of commercial ventures utilizing this same technology. As a result, more and more webpages are being added to the Internet on a daily basis by such ventures. This leads to a difficult environment for a user to navigate through, and the complexity increases with each new node and webpage added.

In particular, the Internet has quickly evolved into a commonplace and highly effective way to view and retrieve information from a variety of different sources.

Information is included in a website, which is typically comprised of one or more webpages. The webpages are linked together via reference to a URL (Uniform Resource Locator) which exists for each page. When viewing a website, the information is structured so that each webpage typically contains URL information linking it to other webpages. Various clickthrough areas or "thumbnails" on the page are arranged so that the user can select those areas and move onto new topical material. The strategic placement of these clickthrough areas on the page will often influence where a user will proceed to next. For instance, clickthrough areas towards the top of the page are often accessed more often than clickthrough areas towards the bottom of the page (because they are more readily accessible). The rate of access is also influenced by the type of user. As a user navigates through a website, a trail or path is created through the webpages. When dealing with certain users or types of users, this trail or path could prove to be very valuable in determining what types of information to next present, or put forth, before the user.

Currently, the two most popular web browsers (e.g. Netscape Navigator™, and Microsoft Internet Explorer™), allow a user to mark a certain webpage for later viewing. Such browsers can also provide a historical list of webpages accessed by the user. As a result, the URL for that webpage is stored in a list which the user can later access and use to conveniently retrieve the webpage. Still other programs have been developed which can provide a hierarchical view of a webpage or website structure, and in particular a list of webpages (or websites) which were visited by a user. This type of program proves to be inadequate, however, for indicating the relative level interest that might have been shown by a user for a particular webpage. For instance, if the user simply clicked through a particular webpage on the way to viewing a more desired page, then the interim page would show up in the hierarchy, with no indication that it was more or less desirable than all of the other pages. This would make it much more difficult for the user to relocate, in a hierarchy of webpages, those certain webpages which the user found most interesting.

In view of the foregoing, it would be beneficial if a method existed by which a user could indicate a relative level of interest in one structured set of information over

another structured set of information. For example purposes, a typical structured set of information would include a website, or webpage. A related benefit would follow if the interest indicator could then be used to present or derive a hierarchy of webpage usage and interest. It would also be beneficial to derive a pattern of webpage usage, and use this pattern to predict further levels of user interest, based upon the pattern and/or user characteristics. Also it would be beneficial if the interest indicator could be searched and used to retrieve webpages and present webpage usage.

Summary of the Invention

The present invention relates to a method for deducing interest in, and the value of, specific pieces of information by a user within an information structure for presenting information to the user. According to one aspect of the present invention, such information structures for presenting information would include, but are not limited to, a webpage, or set of webpages, or website. To facilitate further discussion, a webpage or website will be used in the examples below.

According to another aspect of the present invention, the relative interest by a user in certain information structures is deduced by monitoring the user's additions of annotations to graphical and textual objects located on a webpage. The annotations might include the simple act of highlighting the object, or additionally adding words associated with the object. The annotations can be stored and used to indicate a relative level of interest by a user in one webpage over another webpage. This method of deducing user interest is particularly advantageous in that the user is motivated to enter the annotations for their own benefit (e.g. the user might later review the annotations, or use them to re-locate certain material).

Still another aspect provides that the level of interest might thereafter be used to generate a model of a user, or group of users. Additionally, a predictive pattern through a collection of webpages can be developed for a particular type of user, or group of users. The model or pattern could be used, for instance, to direct or influence the next webpage or set of information presented to a user. Relatedly, the webpage layout of topical

material (and choices deriving therefrom) could be directed or influenced by the user model, or predictive pattern, for a user with certain characteristics.

A further aspect of the present invention provides that the level of interest, by one user or a group of users, might be used to further direct development of new content, or the editing of existing content. The annotations of segmented groups of users can be used to assess the quality and relevance of the content of the website. This is particularly useful when content development is expensive and choices need to be made between developing one set of pages over another set.

In still a further aspect, once the annotations have been entered by a user, the annotations might later be retrieved by the user, or a collection of users, for reference, or to aid in navigation through a collection of webpages. A hierarchical representation, or tree, of webpages might be generated based upon the relative level of interest for each webpage. The annotations are also searchable in order to locate webpages or generate hierarchical trees based upon various search criteria.

For instance, the user might enter various notes or comments within a particular website. Upon proceeding through each linked webpage, the user would make annotations to various objects within the webpage(s). Such notes, or annotations, would provide a future reference to the user when trying to navigate through a collection of webpages, or parts thereof. The website provider might also use these annotations to detect a varied level of interest in the associated webpages and contents thereof. The interest level could then be used, among other things, to generate a pattern of interest for a particular type of user, or to generate a hierarchical tree of annotated webpages.

These and other advantages of the present invention will become apparent upon reading the following detailed descriptions and studying the various figures and drawings.

Brief Description of the Drawings

Figure 1 illustrates, in accordance with one embodiment of the present invention, a block diagram of a representative webpage that provides annotation areas which correspond to graphical and/or textual objects on the page.

Figure 2 illustrates, in accordance with one embodiment of the present invention, a block diagram of a representative webpage hierarchy, or tree, with certain pages delineated as annotated.

Figure 3 illustrates, in accordance with one aspect of the present invention, a table which tallies the relative degree of interest in a particular page via the number of annotation words.

Figure 4(a) illustrates, in accordance with one aspect of the present invention, a past pattern followed by a user through the representative webpage hierarchy of Figure 2.

Figure 4(b) illustrates, in accordance with one aspect of the present invention, a current pattern being following by a user through the same (or similar) hierarchy of Figure 2.

Figure 5 illustrates, in accordance with one aspect of the present invention, a block diagram wherein the type of user is identified and used to select a pattern which further influences the layout of the webpage.

Figure 6 illustrates, in accordance with one aspect of the present invention, a flowchart of example steps for gathering and utilizing the annotation information.

Figure 7 illustrates, in accordance with one aspect of the present invention, a block diagram of representative steps for searching through the annotations and displaying webpages based upon the search criteria.

Detailed Description of the Preferred Embodiments

An invention is described herein for providing a relative measure of interest by a user in one electronic object of information over another object of information. For the purposes of the discussion below, the aforementioned electronic object of information is located on a webpage, which might further be located on a website on the Internet (or on an Internet Service Provider). The purpose and scope of this invention is not meant to be limited to the Internet examples provided below. Moreover, in the following description, numerous specific details are set forth in order to provide a thorough understanding of the present invention. It will be obvious, however, to one skilled in the art, that the present invention may be practiced without some or all of these specific details. In other instances, well-known method steps haven not been described in detail in order not to unnecessarily obscure the present invention.

The preferred embodiment includes providing annotations to a webpage. In particular, the graphical and/or textual objects that comprise a typical webpage (or similar structure for presenting information to the user) are relationally associated with an area for adding annotations to that particular object, or group of objects. The annotations, based upon their length or the content thereof, can then serve as an indicator of the relative interest by a user in a particular webpage, or set of webpages.

The annotations entered by a user can also be used to detect and predict a pattern of interest for that particular user. A set of patterns can be developed and stored which fit certain types or categories of users. When a user starts to annotate certain pages, the pattern can be identified and predictions can be made thereafter regarding webpages in which the user will have further interest. The webpage could then either direct the user to the next site of interest, or dynamically configure the webpage layout based upon the interest pattern for that user.

Certain websites are often limited in storage space for the webpages contained therein. The user annotations will provide a relative level of interest in particular webpages, or portions of the hierarchical website. The pages which illicit further interest from a

contingent of users could thereafter be augmented or further developed in lieu of lesser-viewed pages.

The annotations would also be available for later viewing by the user, or a group of users. A group user name, shared password, or the like, could be provided. The multiple users could then share access to the annotations to facilitate discussions about the material, or further develop the website.

Moreover, the annotations would be searchable based upon various search criteria. Such criteria would include, for instance, the date of annotation, and/or keywords or phrases contained therein. The search results could then be used to produce a hierarchical layout, or tree, of webpages (or websites) based upon the search criteria.

Referring now to Figure 1, a block diagram is shown of a representative webpage which provides for the addition of annotations by the user. A webpage 100 is shown with a representative window 114 for displaying textual (and/or graphical) information. A sentence (or single word or phrase) 110 has been selected, or highlighted, via a user input device (for instance, a mouse, touchscreen, etc.). A clickthrough area or window 102 is associated with this particular object. Such an area (or "annotation area") is often referred to as a thumbnail, particularly if it represents a larger group of objects (e.g. derived from the general phrase "an image the size of a thumbnail"). By clicking on the annotation area 102, a first annotation window 120 is pulled up for entry of annotations by the user. As a second example, an entire paragraph 112 has been highlighted and clickthrough area 106 pulls up the annotation window 130 for entry of annotations associated with the paragraph 112. Other annotation areas 104 and 108 are also shown which might be associated with other text and/or paragraphs in window 114, or elsewhere on the webpage 100.

Alternatively, the act of highlighting the object itself might also be used as a form of annotation, with or without the further addition of words or text. In such a case, the user would not need to further click on a thumbnail to pull up an annotation window (though this might still remain an option). The "annotation area" is therefore construed to include the object(s) which have been highlighted. The very act of highlighting certain text or objects would serve as the annotation, with the highlighted words being placed in an appropriate

annotation area for storage and further analysis and use. Alternatively still, the highlighting alone would serve as sufficient indication of a user's interest in that object material, and/or that webpage.

Figure 2 illustrates a block diagram of a representative webpage hierarchy, or tree 201, with certain pages delineated as annotated. Such webpages might typically comprise a website, wherein the webpages contain URL links to each other. The home page 200 is shown to branch off to webpages 202 and 204 and so on. In this example, annotations have been added to webpages 202, 214, and 218, and these pages are denoted by the symbol (*). Arrow 224 indicates that the hierarchical structure can go on indefinitely.

Figure 2 also illustrates the general prospect that a certain portion of the website might be developed in lieu of another portion due to the level of interest information gleaned from the annotations added by the user. As the webpages continue to branch downward, the annotated pages (shown by *) in this example are generally located in the portion of the pages to the left of the dotted line 226. As a result, a website developer would likely concentrate further development efforts on the webpages to the left of 226. If the developer were limited by storage constraints, development funding, or the like, the addition of information to the more heavily annotated pages would likely yield the most advantageous cost-to-benefit ratio.

Figure 3 shows a representative table 300, which compiles the relative degree of interest in a particular page as a function of the number of annotation words added to each page. For example purposes, the graphical and/or textual objects on page 202 have been shown to be associated with 32 words of annotation (302). Page 214 is shown to be associated with 82 words of annotation (304). Page 218 is shown to be associated with 10 words of annotation (306). It should be noted that the usage of the number of annotation words to indicate the relative level of interest in a particular page is provided for example purposes only. The invention is not limited to this mode of measurement, and many other means for deriving a relative level of interest from the annotations exist. For example, another method would be to use a natural language processor on the text of

the annotations to derive the level of interest as a function of what was actually written in the annotations. Still another method might include a weighting system based upon the occurrence of certain words (or phrases) in the annotations, with certain words carrying more weight than others in deriving the level of interest.

Referring now to Figure 4(a), a representative "past" pattern is shown which corresponds with the hierarchical webpage example of Figures 2 and 3. As shown, the user progressed from webpage 200 down to webpage 202, wherein an annotation of 32 words was added. The user then progressed down to webpage 214, wherein an annotation of 82 words was added. The user needed to reroute back up through webpage 202 to progress to webpage 222. Webpage 218 was thereafter accessed, wherein an annotation of 10 words was added. If this pattern were then stored, and/or categorized for a certain type of user, it might thereafter be used to predict the forward path of a similarly situated user who started down the same path and added similar annotations.

As such, Figure 4(b) shows the start of a new path from a different (second) user, the second user moving from the home page 200 to webpage 202. This user also entered an annotation for webpage 202. If, for instance this second user has similar characteristics to the first user in Figure 4(a), then it can be predicted that after webpage 202, this second user will have more interest in seeing information on page 214, rather than page 216. In one embodiment, the previous pattern can be applied towards generating the next webpage to be seen by the user (e.g. page 214). In yet another embodiment, the previous pattern might be used to predict the likely choices to be made by a user regarding where the user would like to proceed next for information. A representative model of a particular user might also be formed based upon user annotations, and deductions derived therefrom.

To facilitate use of the prediction pattern and/or user model, the orientation of clickthrough areas on the webpage can be tailored and arranged to address the likely desires for further information by that particular user. Referring to Figure 4(c) for instance, the webpage 200 is shown with an area 400 for displaying graphical 401 and/or textual objects 403, 405. The clickthrough areas 402, 404, and 406 have been

specifically arranged to be links to webpages 202, 214, and 218 respectively, based upon the pattern demonstrated by the user. The user is thereby presented with a convenient link to the most likely areas of interest as a function of annotations entered by this user, and other similarly situated users. Area 400 might also include links to such pages of interest (e.g. 202, 214, and/or 218) based upon the pattern for this user. Similar to Figure 1, this page and subsequent pages include annotation boxes 408, 410, and 412 for further entering annotations to the webpage.

In yet another embodiment, a user is prompted to enter certain identifying information. Alternatively, characteristic information about the user might be gleaned from user clickthroughs on various topics (e.g. an interest in rock music, stamps, animals, etc). Alternatively still, such information might be retrieved from a cookie file, database file, or the like which has been stored generated and stored concerning a particular user. Referring now to Figure 5, a block diagram 500 is shown wherein a pattern is selected based upon certain user characteristics, and the pattern is used to further guide the user through webpage selections. The pattern might also be used to selectively present advertisements or merchandise which is most likely to be of interest to the user.

In this example, the webpage (or collection of webpages) might contain educational materials. The user 502 has been identified as an educator. A pattern selection device 504 (including, for instance, a software device, hardware device, or a combination thereof) stores and retrieves patterns related to the characteristics of various users (e.g. an educator, administrator, student, etc.). The selected pattern is then used to guide or influence the presentation of information on the webpage 506. In particular, the topical material and/or clickthrough layout can be varied, similar that shown for Figure 4(c), to coincide with the pattern of interest for a particular type of user.

Referring now to Figure 6, a flowchart 600 is shown of representative steps that might be used implement various embodiments of the present invention. In step 602, the different graphical and/or textual objects are displayed on the webpage. The user then highlights various objects on the page, and a determination 604 is made as to which objects have been highlighted. Typically this is done by a click-and-drag operation via a

computer-pointing device such as a mouse. The act of highlighting an object (or set of objects) causes an annotation area to be accessible for annotation entries. The annotation area might consist of a window which automatically prompts the user 606 for an entry, or prompts the user for an entry when the user selects the annotation window or clickthrough area. Figure 6 shows additional steps which might optionally be employed after entry of the annotations by a user. Step 608 shows the use of the annotations to indicate a relative level of interest in some webpages over other webpages. As discussed above, this could be done via a word-count on the annotation entries, or deciphering and understanding the annotations or keywords contained therein, and so forth. The level of interest could also be used to generate a perceived quality, value, and/or relevance of the context of the material on a particular webpage or website. While a variety of "quality" or "value" parameters might be used, the number of words serves as a simple example. The longer the annotation, the greater the perceived value or quality or relevance of the information presented in the information structure. Context, or actual comments in the annotation, might also be analyzed (e.g. user comments, in their simplest form, like "this is good information" or "this is bad information" and the like). This could be done for groups of users (segmented by certain characteristics), and/or individual users. Step 610 shows that the derived level of interest (or perceived quality, etc.) might then be used to focus development efforts on certain webpages, or portions of a website, as similar to that shown in Figure 2. The perceived quality (value, etc.) of the information can further be used to influence or direct the expansion, editing, and/or deletion of certain portions of the structured information.

Step 612 shows a separate path wherein the annotations can be used to develop a pattern of interest for a particular user, or type of user, as similar to that shown in Figures 4(a) and 4(b). Step 614 shows the use of the pattern to guide a user through the webpages, as similar to that shown in Figures 4(c) and 5.

Step 616 shows yet another path deriving from step 606 wherein the annotations can be used to generate a usage tree to guide the user through previous pages that were visited, the tree also showing the user's relative level of interest via what was entered in the annotations.

Figure 7 shows a block (or flow) diagram 700 that illustrates the application of a searching capability to the annotations. In step 702, the user is prompted for annotation search criteria such as dates or keywords. For instance, the user might want to search for and view annotations (and associated webpages) which were created after (or on, or before) a certain date. Alternatively, the user might also search for keywords or phrases within the annotations. Notably, the annotations are stored in a searchable location, most typically the storage area of the website provider. Step 704 shows the stored annotations being searched according to the various search criteria. Step 706 shows the resulting arrangement and display of the hierarchy of webpages based upon the search criteria. While any variety of hierarchical trees or listings might be produced, several examples are shown below step 706. Example 708 shows the generation of a tree of pages with annotations deriving from a given date. Example 710 shows the generation of a tree of pages arranged in descending order based upon the number of annotations entered by the user per page. Example 712 shows the generation of a tree of pages based upon a key word search. In any of these examples, the tree of pages would be presented to the user in a fashion such that any particular webpages of interest could be selectively accessed, or further investigated. Similarly, search refinements could be used to produce further hierarchical trees based upon new, or refined, search criteria.

What is claimed is:

1. A method for deducing interest in information presented to a user including graphical and textual objects within at least one information structure, the information structure having at least one annotation area, the method comprising:
 - displaying objects that are associated with one or more annotation area;
 - providing for the selective indication of objects to be annotated;
 - providing for entry of at least one annotation associated with a selected object in the at least one annotation area of an information structure.
 - using the annotations to derive a level of interest by the user in the annotated objects.
2. The method of Claim 1, wherein the entry of at least one annotation includes highlighting of the object and/or adding associated text.
3. The method of Claim 2, wherein the information structure for presenting information to a user includes a webpage, or a website which includes at least one webpage or a link to a webpage.
4. The method of Claim 2, wherein the annotations are used to derive a level of interest by a user in at least one information structure.
5. The method of Claim 2, wherein the annotations are used to derive a relative level of interest by a user between annotated objects.
6. The method of Claim 2, wherein if two or more information structures are visited, the annotations associated with these structures are used to derive a relative level of interest by a user between the two or more information structures.
7. The method of Claim 2, wherein the level of interest is a function of the number of words entered in the at least one annotation area.

8. The method of Claim 2, wherein the level of interest is a function of content of the words entered in the at least one annotation area.
9. The method of Claim 2, wherein the level of interest is a function of weighting placed on the words entered in the at least one annotation area.
10. The method of Claim 2, wherein the at least one annotation is used to develop a model of a user.
11. The method of Claim 10, wherein the model is used to direct presentation of the information.
12. The method of Claim 2, wherein the at least one annotation is used to derive a pattern through a set of information structures.
13. The method of Claim 12, wherein the pattern is used to guide a user through the information structures.
14. The method of Claim 12, wherein the pattern is used to selectively present advertisements or merchandise most likely to be of interest to a user.
15. The method of Claim 2, wherein the level of interest is used to guide development of a particular area of an information structure.
16. The method of Claim 15, wherein the further perceived quality and value of the annotated information is used to expand, edit, or delete a particular area of an information structure.
17. The method of Claim 2, wherein annotations which have been added by groups of users are used to assess the quality and relevance of the content of the information structure.

18. The method of Claim 2, wherein the at least one annotation can be accessed by multiple users.
19. The method of Claim 2, wherein the at least one annotation is used to show the user previously visited information structures.
20. The method of Claim 2, wherein the level of interest is used to hierarchically present the previously visited information structures.
21. The method of Claim 2, which further includes:
providing for a search through the at least one annotation using search criteria.
22. The method of Claim 20, which further includes:
using the search results to present previously annotated information structures.
23. The method of Claim 21, wherein the previously annotated information structures are presented hierarchically according to the search criteria.

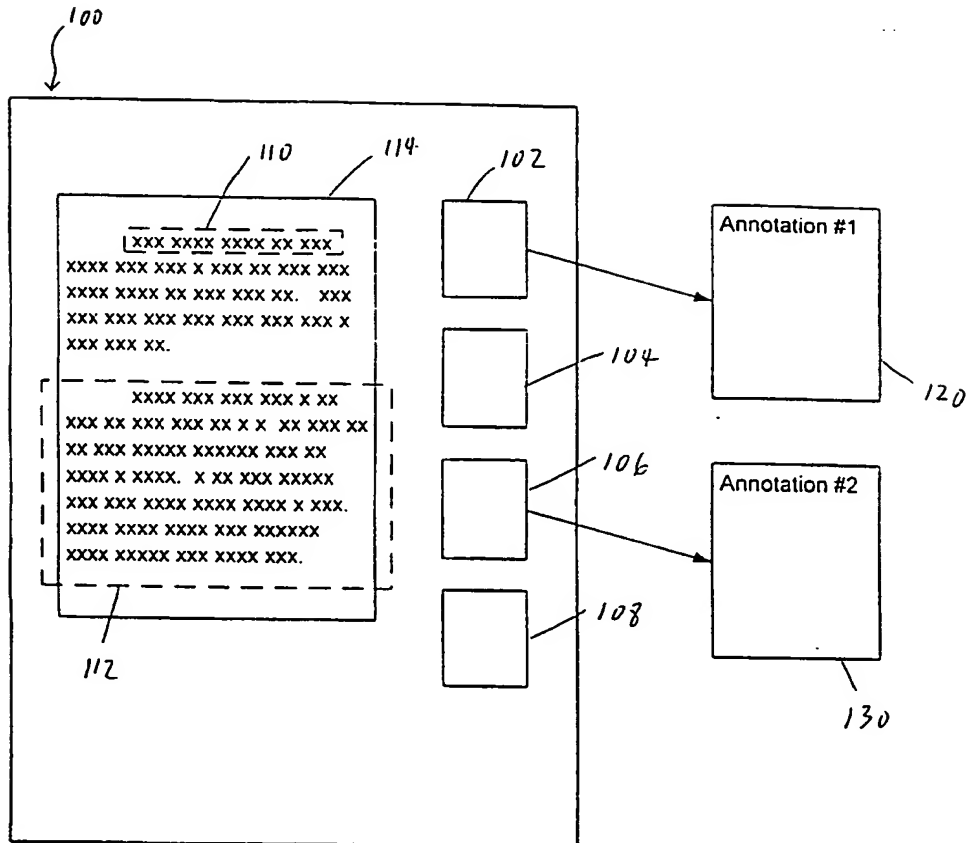


Figure 1

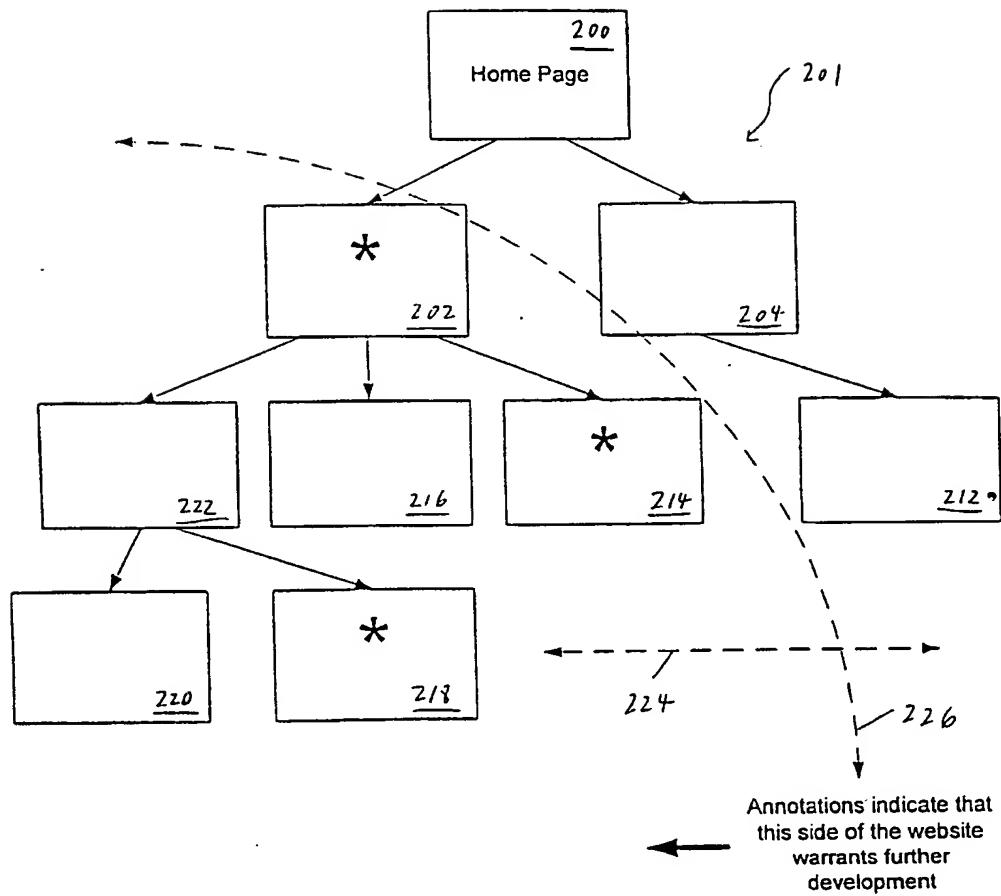
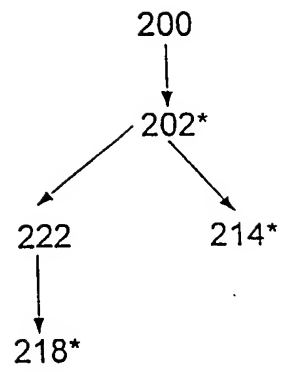


Figure 2

| Page | Annotation | 300 |
|-------------|------------|-----|
| Page 200 | 0 words | |
| Page 202 | 32 words | 302 |
| Page 204 | 0 words | |
| Page 206 | 0 words | |
| <div></div> | | |
| Page 214 | 82 words | 304 |
| <div></div> | | |
| Page 218 | 10 words | 306 |
| <div></div> | | |

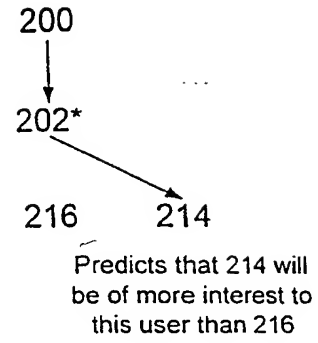
Figure 3

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Past Pattern

(a)



Current Pattern

(b)

Figure 4

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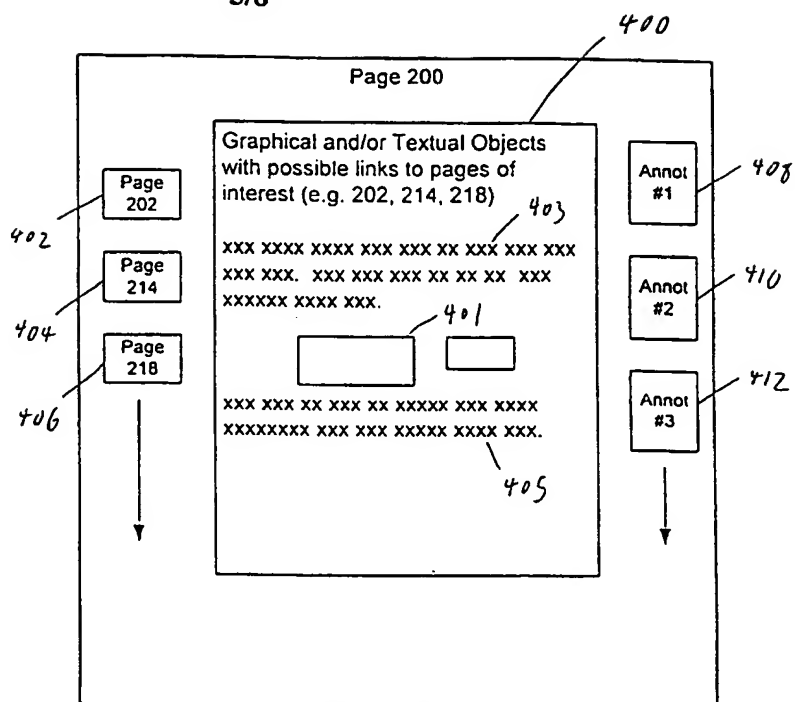


Figure 4(c)

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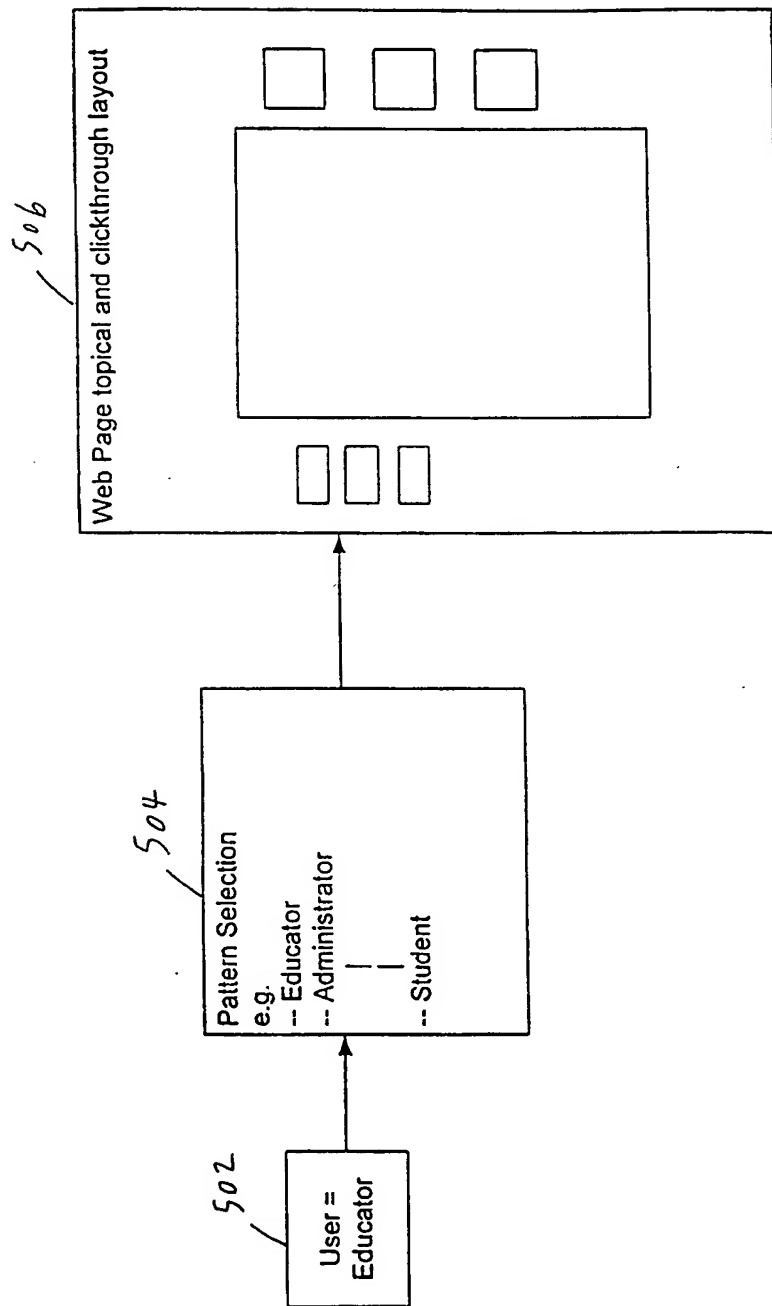


Figure 5

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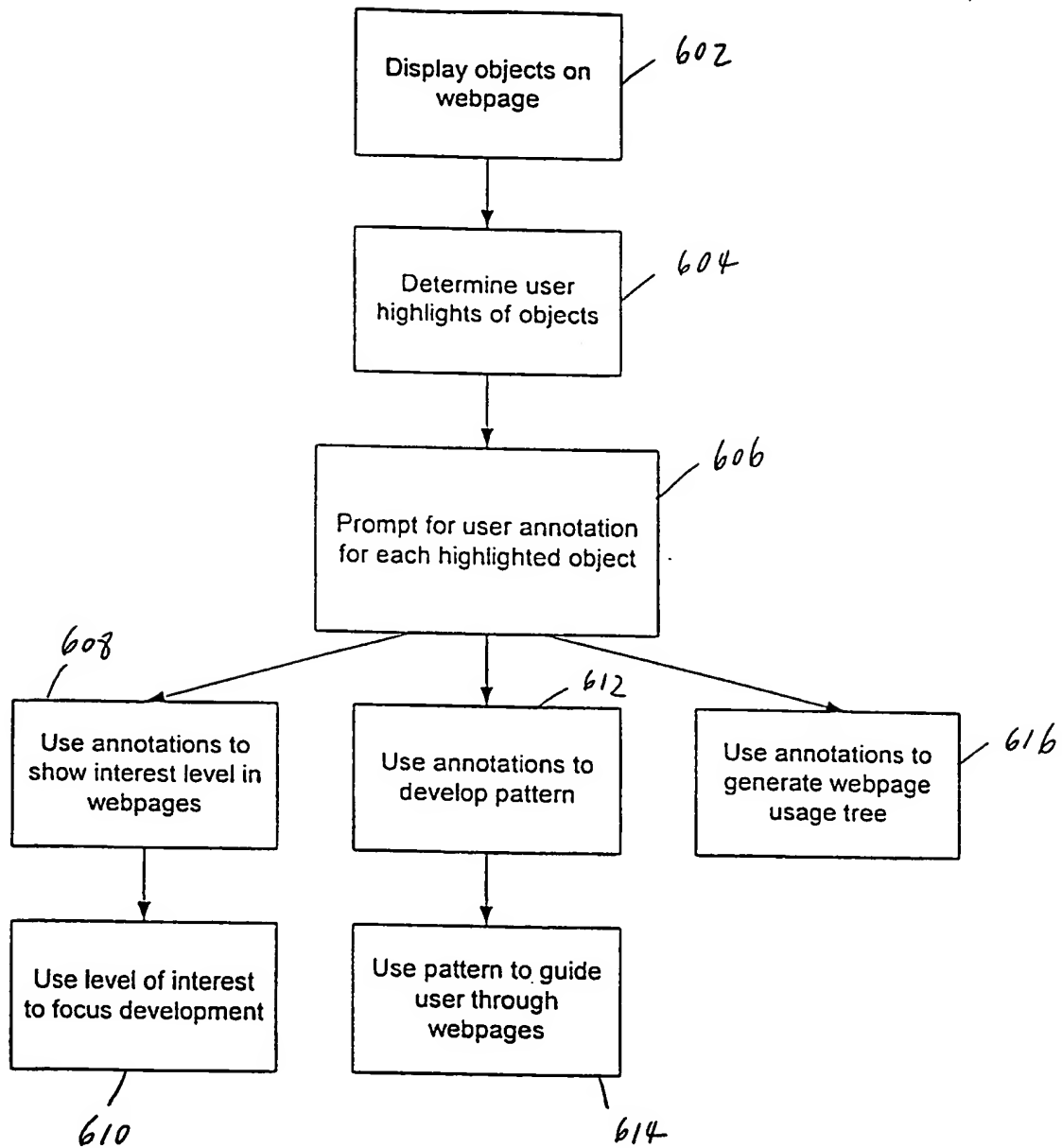


Figure 6

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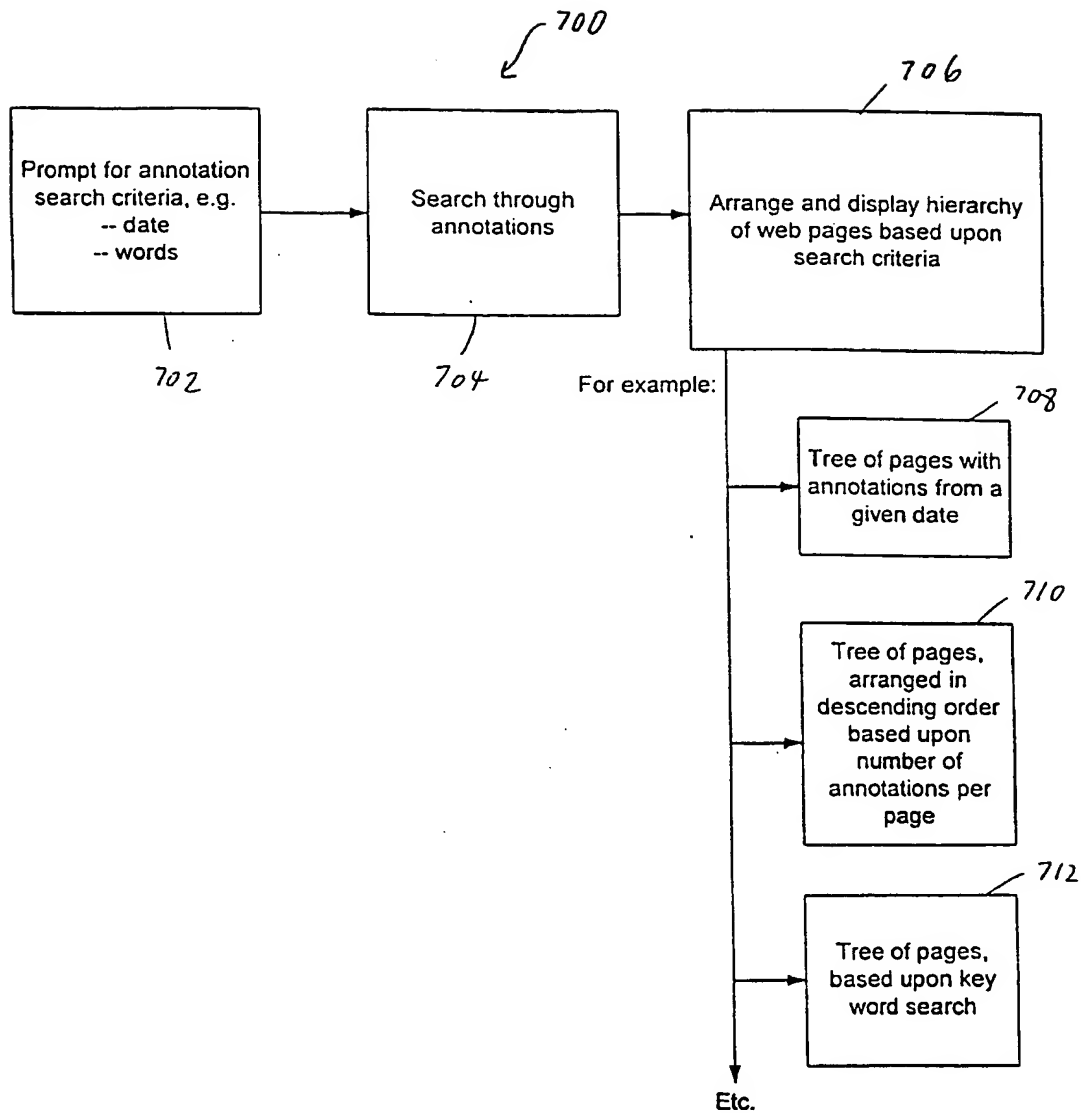


Figure 7